What is Claimed Is:

1. A gas monitoring apparatus for monitoring hydrogen and optionally carbon monoxide in a gas stream comprising:

a conduit in fluid flow communication with said gas stream, said conduit providing substantially laminar flow of said gas stream;

a container in fluid flow communication with at least a portion of said gas stream, said container housing at least two sequentially arranged, electrically isolated electrochemical cells, each of said cells having a first and a second reactive surface area, said first and said second reactive surface areas of a first and a second of said cells being essentially the same or in a selected proportion, said container is arranged to cooperate with said cells to define a first and a second gas flow path, said first gas flow path is sequentially along said first reactive surface areas of said cells and said second gas path is along said second reactive surface areas of said cells;

at least one regulator for regulating the voltage of at least said first and said second cells;

at least one current monitor arranged to detect a current produced by the reaction of hydrogen at said reactive surface area of said cells.

2. The gas monitoring apparatus of claim 1 wherein said first and second reactive surface areas of said first and second cells are essentially the same.

3. The gas monitoring apparatus of claim 1 wherein said first and second reactive surface areas of said first and second cells are different.

4. The gas monitoring apparatus of claim 1, further comprising means for determining the amount of hydrogen in said gas stream proportional to said current from said cells.

5. The gas monitoring apparatus of claim 4, wherein said means includes a flow meter in fluid flow communication with said gas stream.

6. The gas monitoring apparatus of claim 4, wherein said means includes a look up table.

7. The gas monitoring apparatus of claim 1, wherein said cells further comprise a polymer membrane between said first and said second reactive surface areas of said cells, wherein said polymer provides for exchange of protons between said first and said second reactive surface area of each of said cells.

8. The gas monitoring apparatus of claim 1 further comprises a gas diffusion layer for sequentially diffusing said portion of said gas stream along said first flow and said second flow paths onto said first and said

second reactive surface areas of said cells, said diffusion layer further comprises sequential gas flow passages between said cells.

9. The gas monitoring apparatus of claim 1, wherein said portion of said gas stream flows along said first gas flow path and wherein an oxidant gas stream flows along said second gas flow path.

10. The gas monitoring apparatus of claim 1 further comprising means for comparing the amount of said current produced by said first and said second cells.

11. The gas monitoring apparatus of claim 10 further comprises a signal generator which produces a signal when the amount of said current produced by said first cell is greater than the amount of said current produced by said second cell.

12. The gas monitoring apparatus of claim 10 further comprises a signal generator which produces a signal when the amount of said current produced by said first cell is less than the amount of said current produced by said second cell.

13. The gas monitoring apparatus of claim 1, further comprising a third cell downstream of said first and said second cells in said first and said second gas flow paths, said third cell includes a first and a second reactive surface area at least as great as said reactive surface areas of said first and said second cells and wherein said regulator maintains the voltage of said third

cell at a level less than the voltage of said first and said second cells.

14. A gas monitoring apparatus for monitoring hydrogen and optionally carbon monoxide in a gas stream comprising:

at least two electrically isolated, electrochemical cells arranged in sequence relative to a flow path of at least a portion of said gas stream, each of said cells having a reactive surface area;

at least one regulator for regulating the voltage of said cells; and

at least one current monitor arranged to detect a current produced by the reaction of hydrogen at said reactive surface area of said cells.

15. The gas monitoring apparatus of claim 14, wherein said reactive surface area of a first and a second of said cells are approximately the same.

16. The gas monitoring apparatus of claim 14, wherein said reactive surface area of a first and a second of said cells are different.

17. The gas monitoring apparatus of claim 14, wherein said regulator maintains the voltage of a first and a second of said cells at approximately the same level.

18. The gas monitoring apparatus of claim 14 wherein said regulator maintains the voltage of said first and second cells at different levels.

19. The gas monitoring apparatus of claim 14 further comprises a container arranged to cooperate with said cells to define said gas flow path sequentially along said reactive surface area of said cells.

20. The gas monitoring apparatus of claim 14 further comprises means for determining the amount of hydrogen in said gas stream proportional to said current from said cells.

21. The gas monitoring apparatus of claim 20, wherein said means includes a flow meter in fluid flow communication with said gas stream.

22. The gas monitoring apparatus of claim 20, wherein said means includes a look up table.

23. The sensor of claim 14 further comprises a third cell in said gas flow path downstream of a first and a second of said cells, said third cell having a reactive surface area at least as great as said first and said second cells, and wherein said regulator maintains the voltage of said third cell at a level less than the voltage of said first and said second cells.

24. The sensor of claim 14 further comprises means for comparing the amount of current produced by a first and a second of said cells.

25. The sensor of claim 24 further comprises a signal generator which produces a signal when the amount of said current produced by said first cell is greater than the amount of said current produced by said second cell.

26. The sensor of claim 24 further comprises a signal generator which produces a signal when the amount of said current produced by said first cell is less than the amount of said current produced by said second cell.

27. A method for monitoring hydrogen and optionally carbon monoxide in a gas stream comprising:

providing at least two electrochemical cells arranged in sequence relative to and in fluid flow communication with a flow path of at least a portion of said gas stream, said cells are electrically isolated from one another and each cell having a reactive surface area;

maintaining the voltage of a first one of said cells and the voltage of a second one of said cells at essentially the same level or in a selected proportion;

flowing said gas stream in said flow path along said reactive surface area of said cells, in sequence; and

monitoring the current produced by the reaction of hydrogen at said reactive surface area of said cells.

28. The method of claim 27 further comprises the step of determining the amount of hydrogen in said stream,

said amount of hydrogen is proportional to said current of said cells.

29. The method of claim 27 further comprises the step of comparing the amount of said current of a first one of said cells and a second one of said cells.

30. The method of claim 27 further comprising one or more of (a) determining whether the current of said first cell is less than said current from said second cell; (b) determining whether said current from said first cell is greater than said current from said second cell; and (c) determining whether the ratio of current from said first and second cells differs from said selected proportion of said voltage.

31. A method for monitoring hydrogen and optionally carbon monoxide in a gas stream comprising:

providing a conduit in fluid flow communication with said gas stream;

providing at least two electrochemical cells arranged in sequence relative to and in fluid communication with a flow path of at least a portion of said gas stream, said cells are electrically isolated from one another, each of said cells having a reactive surface area, said reactive surface area of a first one of said cells is approximately the same as a second one of said cells;

diverting said portion of said gas stream from said conduit to said cells, said cells are

arranged sequentially with respect to said diverted gas stream;

maintaining the voltage of said first and said second cells at approximately the same level;

flowing said diverted gas stream along said reactive surface area of said cells, in sequence; and

monitoring the current produced by the reaction of hydrogen at said reactive surface area of said cells.

32. The method of claim 31 further comprising the step of determining the amount of hydrogen in said diverted gas stream proportional to said current produced by said cells.

33. The method of claim 32 further comprising the step of determining the amount of hydrogen in said gas stream in said conduit based on the proportion of flow in said diverted gas stream to said gas stream in said conduit.

34. The method of claim 33 further comprises the step of providing a flow meter in fluid flow communication with said gas stream in said flow conduit.

35. The method of claim 33 further comprises the step of providing a look up table referencing values for current produced by the reaction of hydrogen at said reactive surface area of said cells compared to the amount of hydrogen in said stream.

36. The method of claim 31 further comprises comparing the amount of said monitored current produced by said first cell and the amount of current produced by said second cell and determining whether the current produced by said first and said second cell is essentially the same.

37. The method of claim 33 further comprises generating a signal when said current of said first and said second cells is approximately the same.

38. The method of claim 36 further comprises generating a signal when said current of said first cell is greater than said current of said second cell.

39. The method of claim 38 further comprises increasing an amount of H_2 in said gas stream when said current of said first cell is greater than said current of said second cell.

40. The method of claim 36 further comprises generating a signal when said current of said second cell is greater than said current of said first cell.

41. The method of claim 40 further comprises reducing the amount of CO in said gas stream when said current of said second cell is greater than said current of said first cell.

42. A method for monitoring hydrogen and optionally carbon monoxide in a gas stream comprising:

providing at least two electrochemical cells arranged in sequence relative to and in fluid

flow communication with a flow path of at least a portion of said gas stream, said cells are electrically isolated from one another, and each cell having a respective reactive surface area;

providing a fuel cell stack downstream of said electrochemical cells in fluid flow communication with said gas stream;

maintaining a voltage of a first one of said electrochemical cells and a voltage of a second one of said electrochemical cells at essentially the same level;

flowing said gas stream in said flow path along said reactive surface area of said electrochemical cells in sequence;

monitoring the current produced by said electrochemical cells;

determining the amount of hydrogen reacted at said reactive surface areas of said electrochemical cells proportional to said monitored current and corresponding to said amount of hydrogen in said stream which is upstream from said fuel cell stack;

monitoring the current produced by said fuel cell stack;

determining the amount of hydrogen reacted in said fuel cell stack proportional to said current produced by said fuel cell; and

determining the amount of hydrogen in said gas stream downstream of said fuel cell stack corresponding to the difference between the amount of said hydrogen in said stream which is

upstream of said fuel cell stack and said amount of hydrogen reacted in said fuel cell stack.

43. The method of claim 42 further comprising the step of providing a laminar flow conduit in fluid flow communication with said gas stream and said electrochemical cells.